

CLAIMS:

1. A method for vaporizing organic materials onto a substrate surface to form a film, comprising:
 - a) providing a quantity of organic material into a vaporization apparatus;
 - b) actively maintaining the organic material in a first heating region in the vaporization apparatus to be below the vaporization temperature;
 - c) heating a second heating region of the vaporization apparatus above the vaporization temperature of the organic material; and
 - 10 d) metering, at a controlled rate, organic material from the first heating region into the second heating region so that a thin cross section of the organic material is heated at a desired rate-dependent vaporization temperature, whereby organic material vaporizes and forms a film on the substrate surface.
- 15 2. The method according to claim 1 where the organic material is metered through a permeable member into the second heating region at a controlled rate that varies linearly with vaporization rate.
- 20 3. The method according to claim 1 further including providing a deposition chamber and interrupting the vaporization and thereby minimizing contamination of the deposition chamber walls and conserving the organic material when a substrate surface is not being coated.
4. The method according to claim 1 further including providing a residence time at elevated temperature that permits heating to higher temperatures to achieve substantially higher vaporization rates without substantial material degradation.

5. The method according to claim 1 where a constant volume is maintained in the second heating region so as to establish and maintain a constant plume shape.

6. The method according to claim 1 wherein the first heating 5 region is maintained at a constant heater temperature as the organic material is consumed.

7. The method according to claim 1 wherein the second heating region is maintained at a constant heater temperature as the organic material is consumed.

10 8. The method according to claim 1 further including providing a cooling base block surrounding the organic material in the first heating region and providing a liquid between the cooling base block and the organic material in the first heating region to provide thermal contact and a vapor-tight seal between the organic material and the cooling base block.

15 9. The method according to claim 1 wherein the organic material is metered on the surface of a rotatable drum into a second heating region at a controlled rate that varies linearly with vaporization rate.

10. A method for vaporizing organic materials onto a substrate surface to form a film, comprising:

20 a) providing a quantity of organic material having at least two organic components into a vaporization apparatus;

b) actively maintaining the organic material in a first heating region in the vaporization apparatus to be below the vaporization temperature of each of the organic components;

- c) heating a second heating region of the vaporization apparatus above the vaporization temperature of each of the components of the organic material; and
- d) metering, at a controlled rate, organic material from the first 5 heating region into the second heating region so that a thin cross section of the organic material is heated at a desired rate-dependent vaporization temperature of each of the components, whereby each of the organic material components simultaneously vaporizes and forms a film on the substrate surface.

11. The method according to claim 10 where the organic 10 material is metered through a permeable member into the second heating region at a controlled rate that varies linearly with vaporization rate.

12. The method according to claim 10 further including providing a deposition chamber and interrupting the vaporization rate and thereby minimizing contamination of the deposition chamber walls and conserving the 15 organic materials when a substrate surface is not being coated.

13. The method according to claim 10 further including providing a residence time at elevated temperature that permits heating to higher temperatures to achieve substantially higher vaporization rates without material degradation.

20 14. The method according to claim 10 where a constant volume is maintained in the second heating region so as to establish and maintain a constant plume shape.

25 15. The method according to claim 10 wherein the first heating region is maintained at a constant heater temperature as the organic material is consumed.

16. The method according to claim 10 further including providing a cooling base block surrounding the organic material in the first heating region and providing a liquid between the cooling base block and the organic material in the first heating region to provide thermal contact and a vapor-tight seal between the organic material and the cooling base block.

17. A device for vaporizing organic materials onto a substrate surface to form a film, comprising:

- a) a vaporization apparatus for receiving a quantity of organic material that can have one or more components, each one having a different vaporization temperature, and defining a first heating region and a second heating region spaced from the first heating region;
- b) first heating means for heating the organic material in the first heating region until it is at a temperature below the vaporization temperature of the organic material and for cooling the organic material after it rises above a predetermined temperature;
- c) second heating means for heating the second heating region of the vaporization apparatus above the vaporization temperature of each of the one or more organic components; and
- d) means for metering, including a permeable member, at a controlled rate, organic material from the first heating region into the second heating region so that a thin cross section of the organic material is heated at a desired rate-dependent vaporization temperature, whereby organic material vaporizes and forms a film on the substrate surface.

18. The device of claim 17 wherein the first heating means includes a control passage, and means for pumping a fluid through the passage, such fluid being adapted to either absorb heat from or deliver heat to the first heating region.

19. The device of claim 17 wherein the metering means includes a chamber for receiving the organic material and a piston for raising the organic material in the chamber for metering such material.

20. The device according to claim 17 wherein the first heating means includes a cooling base block surrounding the organic material in the first heating region and providing a liquid between the cooling base block and the organic material in the first heating region to provide thermal contact and a vapor-tight seal between the organic material and the cooling block.

21. The device according to claim 17 wherein the metering means meters organic material into the second heating region at a controlled rate that varies linearly with vaporization rate.

22. The device according to claim 17 further including a deposition chamber enclosing the substrate and for receiving vaporized organic material and wherein the second heating means includes means for interrupting heating so that the temperature falls below the vaporization temperature of the one or more organic components and thereby minimizes contamination of the deposition chamber walls and conserves the organic material when a substrate surface is not being coated.

23. The device of claim 17 wherein the second heating means provides a residence time at elevated temperature that permits heating to higher temperatures to achieve substantially higher vaporization rates without material degradation.

24. The device according to claim 17 wherein the metering means maintains a constant volume in the second heating region so as to establish and maintain a constant plume shape.

25. The device according to claim 17 wherein the first heating region is maintained at a constant heater temperature as the organic material is consumed.